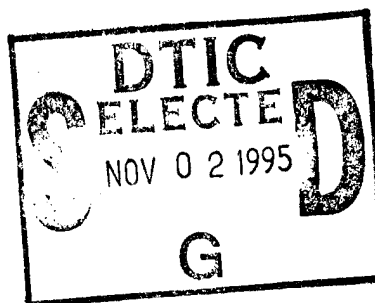


# Silicon Mountain Design

27 January 1995

Office of Naval Research  
Attn: William Miceli, ONR 313, Program Officer  
Ballston Tower One  
800 North Quincy Street  
Arlington, VA 22217-5660



Reference: Contract N00014-94-C-0241  
"An Ultra-High Speed Incoherent-to-Coherent Converter  
for Optical Computing"

In accordance with contract data requirements, enclosed is the monthly status report for the period 1 January - 31 January 1995.

If you have any comments or questions you may contact me at (719) 576-4800.

Sincerely,

David W. Gardner  
Program Manager

Encl.

Copy to: DCMAO Denver  
Director, Naval Research Laboratory, Code 2627  
Defense Technical Information Center (2)  
Ballistic Missile Defense Organization - T/IS

Letter only to: DCMO COS

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Office of Naval Research  
Arlington, VA  
Contract N00014-94-C-0241

Monthly Status Report  
January 1 - January 31, 1995



## DESCRIPTION

Many optical computing problems are centered around the processing of incoherent images. These images may be conventional visible light such as those taken with a CCD imager or camcorder. They may also take the form of infrared images in the case of missile seekers or x-ray images from medical or other sources. For optical processing, these images must be converted to either phase or amplitude modulated coherent light. This is typically accomplished by electronically feeding the originally captured image into a spatial light modulator (e.g., liquid crystal or deformable mirror array) and modulating a coherent reference beam with the 2 dimensional data pattern. The electrical input to the SLM creates a data flow bottleneck in the optical processing system due to the inherently serial input architecture. SMD has proposed a novel incoherent to coherent image converter which solves this problem by providing a massively parallel, optical input feed capability. The proposed architecture utilizes a novel combination of micromachining and ultra-thinned wafer technology to achieve an integrated incoherent to coherent image converter. The converter is capable of directly converting UV, IR, visible, and x-ray energy to a coherent light representation allowing for maximum utilization of downstream optical processing.

## JANUARY ACTIVITIES

During January, photomasks needed to pattern the micromachined gratings and addressing circuitry were fabricated. Prior to mask fabrication, additional test structures were added to the circuit design which will allow us to more accurately characterize key components of the SLM design. These structures included: single pixels which can be driven directly with an external voltage stimulus, addressing circuitry which can be driven and measured directly, and simple FET test structures to evaluate transistor performance in the ultra thin silicon. Device fabrication will begin in the next few weeks.

## TO GO ACTIVITIES

SLM fabrication will begin by mid February 1995. Test fixturing for evaluation of the final devices will also be implemented during this time. Initial testing of the incoherent to coherent converter array will begin in mid to late February.

## PROBLEMS/CONCERNS

None

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## SCHEDULE/BUDGET

Device fabrication is currently about two weeks delayed; however, no impact to the overall program completion is anticipated. The program is within budget.

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TO:

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- 1995 1031 033
1. Reference: DoD Directive 5230.24, Distribution Statements on Technical Documents, 18 Mar 87.
  2. The Defense Technical Information Center received the enclosed report (referenced below) which is not marked in accordance with the above reference.  
STATUS REPORT  
N00014-94-C-0241  
TITLE: AN ULTRA-HIGH SPEED  
INCOHERENT-TO-COHERENT  
CONVERTER FOR OPTICAL  
COMPUTING
  3. We request the appropriate distribution statement be assigned and the report returned to DTIC within 5 working days.
  4. Approved distribution statements are listed on the reverse of this letter. If you have any questions regarding these statements, call DTIC's Cataloging Branch, (703) 274-6837.

FOR THE ADMINISTRATOR:

1 Encl

GOPALAKRISHNAN NAIR  
Chief, Cataloging Branch

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*A*

(Statement)

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DEBRA T. HUGHES  
DEPUTY DIRECTOR  
CORPORATE PROGRAMS OFFICE

(Signature & Typed Name)

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19 SEP 1995

(Date Statement Assigned)